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ABSTRACT

This paper discusses several critical issues concerning feedback in instruction and proposes a text synthesis research paradigm to investigate these variables. The paper is based on the assumption that feedback, a significant adjunct aid in instruction, is currently by and large ineffectual except in some simple instructional contexts. Section 1 deals with general educational issues, including instructional design, behavioral objectives, learning situations, cognitive processing, recall strategies, and memory. It is argued that behavioral management systems have followed Skinner's dictum of small controlled steps to reduce error, and, as a consequence, feedback has been dictated by the assumption that the strategy minimizes significant individual transformations of meaning. Section 2 presents a review of feedback literature, and recent cognitive findings on feedback are discussed. The third section reviews literature relevant to research paradigms. Text analysis is discussed along with the relevance of specific findings to the proposed research model. The paper's fourth section discusses the proposed research; two experiments are desribed. (CJ)

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Instruction and the Feedback Dilemma[1]

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This paper deals with a number of critical issues concerning feedback in instruction, and proposes a text synthesis research paradigm to investigate these variables. The assumption is that feedback, a significant adjunct aid in instruction, is currently by and large ineffectual except in many simple instructional contexts. Section 1 deals with general issues in education, Section 2 presents a review of feedback literature, Section 3 reviews scrambled sequence literature relevant to the research paradigms, and Section 4 discusses the proposed research.

Section 1

Educational specialists are currently under pressure to demonstrate an increased response to demands for individualized instruction. Such learning approaches are generally defined as systems in which the learning approaches are generally defined as systems in which the learning environment is organized and maintained from feedback derived uniquely from each individual student (Langer, Note 1). This stress on individualization reflects increased emphasis on mastery learning (Bloom, 1968), increasing utilization of cost-effective technology, and special needs of students (Gage & Berliner, 1979). The need for effective feedback is obviously critical.

In terms of instructional design, the dominating patterns have included variants of a multi-track, multi-modal model, with considerable usage of programmed learning and computer assistance (Langer, Note 1). All reflect a powerful behavioral bias. However, even with marked trends toward decreasing unit cost for the hardware and increasingly more sophisticated software, the multi-track approach represents a very limited gain over the single track curriculum. The reason is that under present circumstances the same primitive methods of curriculum construction (and feedback) prevail. As a consequence, while the management delivery components (e.g., technology) are becoming rather sophisticated, models of the psychological processes underlying content organization have lagged considerably with respect to systematic development. What changes have occurred, have followed directly from Skinner's (1953) overall view of human learning.

The behavioral position regarding all learning is that of associations formed between stimuli and responses. Learning therefore consists of gradually strengthening or weakening associations as a function of the consequences of the response (Thorndike, 1913). Maltzman's (1955) paper on concept assumption and Bourne and Restle's (1959) work on "cue validity" are all derivatives of this basic postulate. Feedback under these circumstances becomes a mechanistic process of confirming-disconfirming, modifying thought by conditioning or suppressing associations.

Instructionally this model assumes that concepts are arranged in some hierarchial sequence, generally from simple to complex (Gagne, 1977).

Such an arrangement, designed to satisfy behaviorally defined objectives, meets the criterion for programmed instruction independent of format (Markle, 1973). Regardless of the curriculum typologies underlying the specific content (i.e., world-related, concept-related, inquiry-related, learning-theory related, and/or utilization-related), the concept logic tends to dominate (Posner & Strike, Note 2). This means that the sequencing is generally designed to meet subject-matter goals first.

This does not constitute much of a problem in hierarchically derived content such as mathematics or where the objective of the course is to teach a set of predetermined procedures, but these represent a rather limited range of educational experiences. To utilize this approach in other types of learning situations, the developer must accept the operant assumption that environmental manipulations can overcome learner tendencies to significantly transform or modify the content beyond presumed limits.

For example, most variants of the Keller (1969) Personalized Instructional System utilize a single standard text (Robin, 1976). Obviously, the usual text is hardly "programmed" in any sense of the word. The management system therefore compensates for text deficiencies by organizing the content so that the timing for appropriate contingencies is met (Johnson & Ruskin, 1977). Again, the underlying assumption is that learning can be predictively determined through rationally ordered environmental manipulations, operationally defined as a set of direct instructional guides.

However, the prevailing assumption of direct causality between an instructional stimulus (e.g., content, feedback) and subsequent cognitive processing is generally unproven (Winne, 1982; Bilodeau, 1969). Validation of a process based on the product (i.e., a response) is logically weak, since one has to prove there was no other way the student could have derived the response (e.g., alternative strategies). From the behaviorist viewpoint the assumption of a conditioning paradigm with deterministic transformations (e.g., generalization and discrimination gradients) is absolutely critical.

Unfortunately, the phenomenon of subjective organization including the use of strategies in recall is well established (e.g., Anderson, 1980). Indeed, as early as 1932 Bartlett postulated the principle of constructive memory. Other types of memory organizations have been subsequently derived in addition to subjective; i.e., categorical and associative. A number of measures of subjective organization have been posited (e.g., Tulving, 1962; Shuell, 1969; Pellegrino, 1972). Cognitive strategies, as we shall use the term, involve an active serial processing based on feature relevance (Rosch & Mervis, 1975) and rule learning (Bourne, 1970).

Early findings clearly indicated that under free recall conditions subjective order did not necessarily coincide with the original (input) order. Critical is Bousfield's (1953) research that subjective organization is higher under constant rather than variable order of input (Pellegrino & Battig, 1974; Wood, 1972). Their findings suggested to us that the usual

text analysis approach, with processing order imposed by the discourse logic, might be confounding. In our research we intend to explore the input variable by randomly generating the content (i.e., sentences) remaining after each selection, as compared to maintaining order. In addition, subjective organization tends to increase with increased outputs (Postman, 1972), and blocked presentation also increases subjective organization (Buschke, 1976).

The meaningfulness of the material appears to influence recall, although the findings have not established a clear pattern (e.g., Glidden & Roemer, 1974; Gorfein & Blair, 1971). Our text synthesis approach we feel will enable us to explore more fully this issue since we will explore both meaningfulness in terms of original content as well as that suggested by changes in concept strategies as reconstruction develops. In one sense the sequential reconstruction of the discourse may have implications for the part-to-whole and whole-to-part transfer problem (Postman, 1972), and should provide an additional window to the structural propositions of individual semantic memories.

Finally, subjective organization appears to be related to a more general memory ability. Subjective organization appears to correlate with free recall, serial learning, and associative learning of word lists (e.g., Earnhard, 1970). This is a critical aspect of our project, since our assumption is that we are dealing with a stable (if not unique) set of abilities, rather than more situational (and temporary) states.

Putting it another way, while subjective organization may vary from individual to individual, there is stability within the individual. Thus Kozminsky, Kintsch, Coren, & Bourne (Note 3) found at least four different strategies in a moderately complex decision-making problem, while Sternberg and Ketron (1982) found that untrained subjects in an analogy solving problem tended to utilize reliably effective self-generated strategies. As we shall note in our discussion of feedback, these individual differences lead to problems involving linear feedback models, since the developer's assumptions about what is needed may differ markedly from those of the learner at any point.

Although organization is assessed at recall, the differential processing is likely to have occurred during input (Mandler, 1972). Clark and Haviland (1975) point out that inferences are made during acquisition, resulting in an ever-changing memory structure. This necessitates recognition of memory as a developmental phenomenon. Thus, going back to our discussion of the interaction between content and learner strategies, we find for example the intra-individual strategies undergo modification from more simple to complex (Levine, 1975).

The thesis can be made that recent advances in cognition have invalidated many earlier behavioral assumptions about learning. To the curriculum developer, particularly in learning situations depending on a heavy feedback component, the issues have grown exceedingly more complex.

We have argued that behavioral management systems have followed Skinner's dictum of small controlled steps to reduce error, and as a consequence feedback has been dictated by the assumption that the strategy minimizes significant individual transformations of meaning.

The paradox is that while modern cognitive theory can be described accurately as information-processing (Bourne, Dominowski, & Loftus, 1979), the cognitive theorists have yet to systematically address problems of content and sequencing, especially in higher-order learning environments. The issue of feedback is scarcely addressed in instructional terms (Clark, Note 4). Behavioral approaches, on the other hand, have had a great deal to say about content and sequencing as well as feedback, but have generally ignored learner transformations. This paper will explore the impact of more recent cognitive findings on feedback, a critical adjunct aid.

Section 2

Feedback cannot be easily defined, primarily because a number of theoretical positions are embedded in the concept today. Since the instructional implications of feedback may be considered originating essentially from the work of Thorndike and The Law of Effect (Thorndike, 1932), behaviorists have defined it as the consequences of a given response and made it operationally part of the conditioning paradigm (Anderson & Faust, 1973). Thus, one could speak of reward and punishment as confirming and disconfirming consequences respectively, and feedback overall in terms of an incentive model (Buss, Braden, Orgel, & Buss, 1956). The feedback term "knowledge of results" (KR) can easily be utilized by behaviorists, if the confirmation/disconfirmation produces concomitant changes in probability of response through conditioning. Instructionally, more informative KR models can be maintained within the conditioning paradigm (Anderson & Faust, 1973), since the behavioral position does not deal directly with the input of information on incentive, per se. The cognitive position (e.g., Atkinson & Wickens, 1971) assumes that information contributes directly to the immediacy and direction of change.

Typically, the behavioral experimental paradigm involves minimal informational cues aside from the rewards and punishments utilized. Currently it is assumed that the effectiveness of feedback under these conditions is a function of a number of variables, some of which will be discussed later. However, recognizing the necessity of immediate change, the instructional psychologists have developed the concept of "corrective" feedback, defined as specifically directing the learner to modify an incorrect response (Anderson & Faust, 1973). Whereas knowledge of results assumes that probability of response will eventually change through conditioning, corrective feedback mandates changes.

The field of cybernetics has also adopted the feedback mechanism, especially through the modeling of human behaviors by computers or servo-mechanism simulation (Smith & Sussman, 1969). In the area of motor skills, feedback serves as a regulatory mechanism. Subsequently, the cybernetic feedback model has been extended to curriculum development (Pratt, 1981), and human-problem solving (e.g., Newell & Simon, 1976).

Cybernetics moves away from the incentive-with-information-backup model toward an information-as-primary position. The cognitive position also is that feedback has a far greater impact on cognitive processing during the task, as compared to motivational consequences (Bourne, Guy, & Wadsworth, 1967; Spence, 1964; Estes, 1970.

The incentive-informational dispute is probably the most central issue, and has not been resolved. Indeed, it is likely that feedback combines both aspects, although the experimenter has the opportunity to suppress or enchance either dimension depending on design (Getsie, Note 5). As noted, in our paper we shall concentrate on the informational thrust.

Another major problem in neatly conceptualizing feedback is that it is basically a multi-dimensional concept (Holding, 1965). Using a branching paradigm, Holding postulated several dichotomies. The first creates a distinction between extrinsic and intrinsic feedback. Each of the first pair, in turn, can be subdivided into concurrent and terminal. Subsequent dichotomies include: immediate-delayed, verbal-non-verbal, and separate (after each response)-accumulated (after all responses). The number of possible permutations and combinations is awesome. A perusal of the dichotomies clearly indicates that feedback experiments are likely to persist in having the directive and incentive results confounded (Locke, Cantledge, & Kleppel, 1968), although as previously suggested by appropriate selection of treatment variables the incentive or information component can be suppressed.

Feedback, regardless of conceptual complexities and mixed research findings (e.g., Barringer & Gholson, 1979), is considered a critical component by most instructional systems analysts and psychologists (e.g., Davis, Alexander, & Yelon, 1974). By any set of standards it is considered absolutely essential in designing auto-tutorial systems involving computer-based instruction (e.g., Gagne, Wager, & Rojas, 1981). The reason is that under conditions of individualized instruction the student is severely limited in terms of different sources of feedback, and hence the "equalization phenomenon" (Hilgard & Bower, 1975) is attenuated. That is, the student cannot make up for deficiencies anywhere in the instructional situation by utilizing a variety of informational sources. We are not arguing that teachers in traditional classrooms are better managers of feedback. Rather, in individualized technologically-assisted settings the student is obviously more restricted.

Behavioral psychologists, as well as those interested in the area of artificial intelligence (AI) have not been unmindful of this problem (Bunderson & Faust, 1976). Given the early failures in machine language, more extensive attempts were made to develop sophisticated programs which were capable of carrying out a tutorial dialogue with the student. One example was SOPHIE (Sophisticated Instructional Environment), built around problem-solving electronic circuitry (Brown, Burton, & Bell, Note 6).

The assumption was that by providing detailed and analytical feedback, errors could be markedly reduced, and the student redirected in his thinking (Brown, et al., Note 5). While students may attempt to correct themselves

with repeated opportunities (e.g., Singer & Pease, 1978), most instructional psychologists point to findings of error perseveration (e.g., Kaess & Zeaman, 1960) as something to be avoided (e.g., Howe, 1970; Ladas, 1980). Ultimately, one supposes the goal is errorless learning (Terrace, 1963).

Unfortunately, recent work on tutorial languages suggests that the elaborated conceptual model may be detrimental to student performance (Gallagher, 1981). Using the BLOCKS program Gallagher provided diagnostic feedback and information based on an "expert" problem-solving model (which is typical of tutorial programs). However, students not given this help actually performed better on subsequent problems.

Sternberg and Ketron's (1982) previously cited work also suggests that a predetermined feedback strategy model may actually be providing the learner with irrelevant data not conducive to a functional, student generated strategy. It is ironic to note, when early assumptions about simplicity and directness of feedback in programmed instruction were invalidated by students short-circuiting the feedback process by copying answers (e.g., Kulhavy, 1977), subsequent attempts to overcompensate in the other direction may also have had deleterious effects. The key lies, of course, in the basic assumptions of a feedback model based on an "expert" or linear strategy versus those derived explicitly from an analysis of the individual learner's strategy. The difference is expressed also in terms of the curriculum model, with the curriculum developer on one hand deciding in advance what should be done as compared to a more functional analysis of what the individual learner is doing. While the research evidence supporting either experimenter-or learner-determined sequences is mixed (Dansereau, Evans, Wright, Long, & Atkinson, Note 7), there is no reason for solely accepting the developer determined model.

There are several other methodological issues in feedback which we must consider in our research and findings. Foremost is the finding that disconfirmation (negative) feedback impacts achievement much more than confirmation (positive) feedback (Kulhavy, 1977). Researchers in concept acquisition (e.g., Bruner, Goodnow, & Austin, 1956; Trabasso & Bower, 1968) have found that learners shift strategy after disconfirmation, although not back to some simple random selection (Levine, 1966). The disconfirmation paradigm is critical to our study. More subtle and/or qualitative aspects of feedback have been generally ignored (Kulhavy, 1977), but will be part of this research.

The use of feedback during and after the acquisition phase presents several problems. If it is given too soon or is too readily accessible, the error rate increases (Sullivan, Schutz, & Baker, 1967). Moreover, delay in knowledge of results also has diverse effects. Kulhavy (1977) has argued that while feedback should be provided as often as possible during instruction, the content organization and difficulty of the material is also crucial. If the material is very difficult, students spend most of their time guessing at answers and trying to match feedback to the question (Kulhavy, Yekovich & Dyer, 1976). However, where the material is relatively easy and/or student confidence is high, students spend relatively little time on feedback.

Battig (1966), however, suggested that difficulty in learning might have positive consequences. Certainly the issues of when and how much feedback are significant.

Moreover, delay in feedback seems to sometimes facilitate acquisition (e.g., Surber & Anderson, 1975). The argument is that the delay allows for incorrect responses to be forgotten, which approximates the practice interference paradigm (Kulhavy & Anderson, 1972). Finally, very pertinent to our thereotical position and use of feedback is a study by Kulhavy and Parsons (1972) which suggests that the effect of feedback is minimal unless the instructional content is organized in some meaningful way to the learner (e.g., schema, script, etc.).

Section 3

This section deals with literature relevant to our text synthesis method. We should like to begin with a discussion of text analysis. It is not our intent to provide a detailed review of the text analysis method, but to point out the relevance of specific findings to our research model.

The text analysis approach has developed within a number of specialized subareas, including grammar, content, orienting tasks, and knowledge bundles. At the present moment, the theoretical trend is epistemological (i.e., how knowledge is structured). Current theories have been tied essentially to measures of recall (Reder, 1980).

We should emphasize that we are concerned with the acquisition process in utero and subsequent implications for education. Research has clearly demonstrated that recall for prose is subject to the logic of the discourse (e.g., Frase, 1969), as well as the serial position of the discourse elements. There have been a number of attempts to categorize text processing (e.g., Dawes, 1964; Crothers, 1972; Frederiksen, 1975; Rumelhart, 1977; Meyer, 1975). Most have been characterized as more or less successful within the limits imposed by the specific model (Reder, 1980). Generally these programs attempted to simulate via computer the sequential reorganization of prose during processing.

More recently, attempts have been made to link acquisition to outcomes of schemata (or related constructs). These are usually defined as abstract representations of knowledge within the memory structure of the learner (e.g., Rumelhart & Ortony, 1977), and are considered an integral part of text processing. It is assumed that input can be facilitative or interfering depending on the interaction between schema and discourse logic. Relevant also to our research is Schank's (1972) study dealing with sentence and paragraph comprehension. Paragraph generation involves connecting sentences, which presupposes perhaps some integrative processing similar to Kintsch's (1974) micro-macrostructures. Nevertheless, it will be interesting to determine if there is a relative paucity of inferences available per sentence as Clark and Haviland (1976) suppose, and how the number of inferences increases with the reconstruction of discourse.

Subjective organization, as analyzed in text processing, is also a function of familiarity and meaningfulness. Indeed some researchers (e.g., Anderson & Reder, 1979) argue that the schemata available to the subject may have more impact on acquisition than the logic of the discourse itself. The reader should keep in mind our previous discussion of subjective organization.

Comparatively little systematic research has been done using disconnected discourse. The result is that the findings lack coherence in terms of outcomes. Overall, using a free recall procedure, scrambled sequences generally yields poorer performance than connected discourse, regardless of unit size (Danserau, et al., Note 7).

In many experiments involving scrambled presentation little is done to assist the learner using disconnected materials. In a typical study (Frase, 1969), subjects using a name concept strategy were superior to those using an attribute strategy, and both were superior to the scrambled order group. Sasson (1971) interrelated two different topics, a variant of the scrambled order method, and found that a thematic organization produced superior student achievement as compared to temporal (i.e., sentences included a date) and logical arrangements.

Meaningfulness of the materials has also been investigated. Bruning (1970) embedded the test items in contexts which were relevant and ordered, relevant and scrambled, and irrelevant and scrambled. The findings are somewhat unusual in that there was no significant difference between the relevant and ordered and relevant and scrambled contexts, but both were superior to the irrelevant and scrambled. As in nearly all these studies the discussion dealt with concept acquisitions in the ordered material; no one seemed to pay much attention to the what and how of achievement in the scrambled treatment. Tobias (1973), using programmed instruction, found that familiarity overcame to some extent the effects of scrambling. Again using programmed instruction, Brown (1970) found that students encountering a scrambled mathematics sequence took more time, made more erros, and performed more poorly on problems. This is to be expected in a subject area in which meaning is clearly tied to a hierarchical sequence.

The interrelatedness of the sentences is also a factor. Kissler and Lloyd (1973) found that highly interrelated sentences were more sensitive to scrambling. Rothkopf (1962) indirectly assessed this dimension when he used loosely organized sentences to create his discourse treatments. Anderson (1967) suggested that programmed instructional units (i.e., the frame) are developed to be independent, and with the high redundancy of programmed instruction units scrambling may not be as destructive of performance.

While none of the studies cited a feedback mechanism, a study done by Schultz and DiVesta (1972) is unique in that students were allowed to take notes (an outside confirmation source). Again, while the emphasis was on the strategies employed with respect to organized research materials, the researchers also observed that students taking notes modified the passages to suit their needs. That is, they were not forced to at least initially

accept an experimenter determined logic.

In summary, Bartlett (1932) demonstrated that strong recall tended to fit schemata. Current research (e.g., Kintsch, 1974; Meyer, 1975) has reaffirmed this proposition by demonstrating that the probability of inclusion within recall is related to the importance of the statement to the theme. Instructionally, the implications are significant, in that we have argued previously that organization is modified at time of input (Mandler, 1972). Hence, relevancy is a function of learner schemata. Behaviorally oriented instructional psychologists can develop alogorithms for organizing concept elements (e.g., Merrill & Tennyson, 1979) only by ignoring the concept of chunking (Miller, 1956; Buschke, 1976). Since it is assumed that feedback involves active memory (Anderson, 1980), both timing as well as congruence of feedback to schemata and strategy is crucial. These will be addressed in our research.

We feel it can be argued that in most educational situations, particularly in higher-order and non-hierarchical learning, feedback might better serve by assisting in self-correction (Anderson, 1980). This avoids the problem of the instructional developer intruding into functional, and perhaps unique, memory and processing strategies. Certainly we should take heed from Nisbett and Wilson's (1977) findings that learners often cannot accurately verbalize their own strategies. If the learner cannot do it, then instructional psychologists may indeed be on dangerous conceptual grounds. Hence, while Singer (1980) called for optimizing feedback, in the end it may be the learner that dictates the meaning of "optimal."

Section 4

It is rather difficult to specify in usual terms the research recommendations, since the project calls for an evolving research program analyzing several critical issues in feedback relevant to classroom instruction. Our major argument has been that the recipient of a prose discourse, whether written or spoken, builds and processes through a net of possible semantic constructions as the sentences are processed. Synthesis follows when sufficient linguistic cues have been received and transformed to a set of probable meanings, and the singular meaning of the text emerges. This processing is influenced partially by prior real-world knowledge which is idiosyncratic to the perceiver, as well as more commonly shared formal coding processes required by linguistic constraints (e.g., Bourne, et al., 1979). Hence, individuals can be expected to follow unique paths to the common semantic interpretation required for linguistic competence. This hypothesized idiosyncratic processing is basic to the theoretical thrust of the proposed program of feedback research. To recapitulate, current feedback theory date involves both knowledge of results (i.e., confirming/disconfirming) and corrective feedback. It is our thesis that a minimal approach may be more effective, especially where learner processing is heavily involved.

The literature review demonstrates the many potential facets of our research program. However, the research plan will become better defined as our findings emerge. One of the crystallized paradigms will be discussed in detail in order to demonstrate more explicitly the focus of the program. These experiments are necessary as an early exploration to demonstrate (1) the idiosyncratic nature of sentence processing, and (2) the possibility of manipulating feedback variables such as frequency and complexity to meet processing needs for the synthesis of the text schemata. The experiments involve the manipulation of feedback in relation to subjective organization, applying the Tulving paradigm to sentences rather than words.

Stories based on simple active declarative sentences will be used so that verbatim recall as well as recognition may be clearly expected as outcomes. The stories will consist of 20 sentences, organized around such content as the Battle of Gettysburg, the Superbowl, etc. The discourse content logic will be established so there is high agreement among observers for a preferred order. Experimentally the stories can be presented separately or interrelated. The sentences will be presented initially on 3 x 5 index cards.

The task of the learner will be to reconstruct the preferred order of the discourse. Each trial will be on a fixed-time basis, with a one-minute break between trials. There will be an upper limit to the number of trials per student. Both time per trial and number of trials will be derived from pilot studies. The feedback treatments will be discussed in greater detail as part of the experimental design.

Experiment 1

Design

After the first sentence is given, the reconstructed sentence sequence will remain continuously before the subject, with the remaining sentences generated one at a time. Each sentence will actually have two numbers: One assigned by order within the story (unknown to the subject) and a presentation number given on the index card. These latter numbers will be sequential, in order of appearance to the subject. The subject will organize the discourse by reference to the card numbers.

For example, let us suppose the first sentence that is given to the subject is in reality #10 in the story. On the card the sentence appears as #1. Sentence #2 (in reality #3 in the story) then appears. If subjects assign Sentence #2 ahead of #1, they are correct. If they maintain #1 ahead of #2 they are in error. If Sentence #2 is placed ahead of Sentence #1, then #2 is now labeled "1", and #1 is labeled "2".

The feedback content is defined in Experiment 1 as disconfirmation (i.e., the subject is informed that the placement of a sentence is in error). Subjects will also be told they may or may not receive feedback, to avoid the problem of assuming no feedback means "right." They will also be informed that they will be expected to recall the story. Feedback groups are assigned as follows:

Group I will receive no feedback on any trial.

Group II will receive feedback on the first error only within each trial.

Group III will receive feedback on all errors within each trial.

Group IV will receive feedback through the first 10 errors, regardless of trial.

Recall, recognition, time to criterion, and number of errors are the dependent variables. These will be described later.

Subjects will be randomly assigned to one of the two recall/recognition groups described below. The recall/recognition tests will be given 15 minutes after the last trial.

The resulting 2 (story) x 4 (feedback) completely crossed design permits an examination of the absolute versus relative frequency issue in feedback (Bourne, et al., 1967).

Dependent Variables

The dependent variables will include recall and recognition;

1) Recall: Subjects will be asked to recall in writing as much of the story as possible. Accuracy will be based on number of idea units.

2) Recognition (probe technique): Subjects will receive triads of sentences. Within each triad will be a sentence taken directly from the discourse, one a paraphrase, and one inappropriate (i.e., a foil). Accuracy scores will be based on number of verbatim discourse sentences chosen. Error analysis will also reflect number of paraphrase and irrelevant sentences.

Time to criterion and number of errors will be analyzed, and possibly covaried with the recognition and recall scores. This is true for all experiments.

Experiment 2

This experiment will manipulate the informational feedback and frequency issues. The feedback groups will receive information as to process appropriate placement of a sentence when an error is made (as opposed to simply disconfirming placement).

Group I: Subjects receive no feedback

Group II: Subjects receive informative feedback only on first error within each trial.

Group III: Subjects receive informative feedback on all error within trials.

Group IV: Subjects receive informative feedback on first 10 errors only, regardless of trial.

Again subjects will be assigned to either recognition or recall. The design is a 2 (story) x 4 (feedback) completely crossed model.

Other experiments will follow. This study has been funded as an Air Force mini-grant project (AFOSR-83-0149).

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